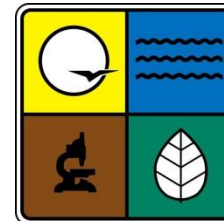


Near-Roadway Air Monitoring & Creating Onroad Mobile Source Emission Inventories

Stephen Hall, Nathan O'Neil
APCP/Air Quality Analysis Section

St. Louis Area Monitoring Agencies Meeting, May 15, 2014
St. Louis County Library, St. Louis, MO



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Monitoring Requirements

- **NO₂**: Final rule revising the NAAQS*, published 2/9/2010; requires near-road (i.e., ≤ 50 m) NO₂ monitoring at
 - 2 sites in the St. Louis CBSA and
 - 1 site in the Kansas City CBSA (based on population and traffic count).
 - Sites were to be identified in the 7/2012 air monitoring plan and begin operation 1/2013

*100 ppb, 3-yr avg of 98th %ile 1-hr avg's

Revised Schedule

- **NO₂:** Final rule revising the schedule published 3/14/2013
 - First St. Louis site and Kansas City site to begin operation 1/2014
 - Second St. Louis site to begin operation 1/2015
- Missouri is ahead of this schedule, thanks in large part to EPA funding
 - First St. Louis site began operation 1/2013
 - Kansas City site began operation 7/2013

Monitoring Requirements

- **CO:** Final rule continuing the NAAQS*, published 8/31/2011; requires near-road CO monitoring (collocated with NO₂ sites) at
 - 1 site in the St. Louis CBSA by 1/2015 and
 - 1 site in the Kansas City CBSA by 1/2017.

*9 ppm 8-hr avg, 35 ppm 1-hr avg, not to be exceeded more than once per year

Monitoring Requirements

- **PM_{2.5}**: Final rule revising the NAAQS*, published 1/13/2013; requires near-road PM_{2.5} monitoring (collocated with NO₂ sites) at
 - 1 site in the St. Louis CBSA by 1/2015 and
 - 1 site in the Kansas City CBSA by 1/2017.

*12 µg/m³ annual, avg over 3 years;

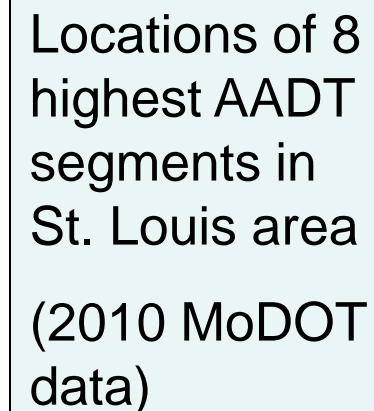
35 µg/m³ 98th %ile daily avg, avg over 3 years

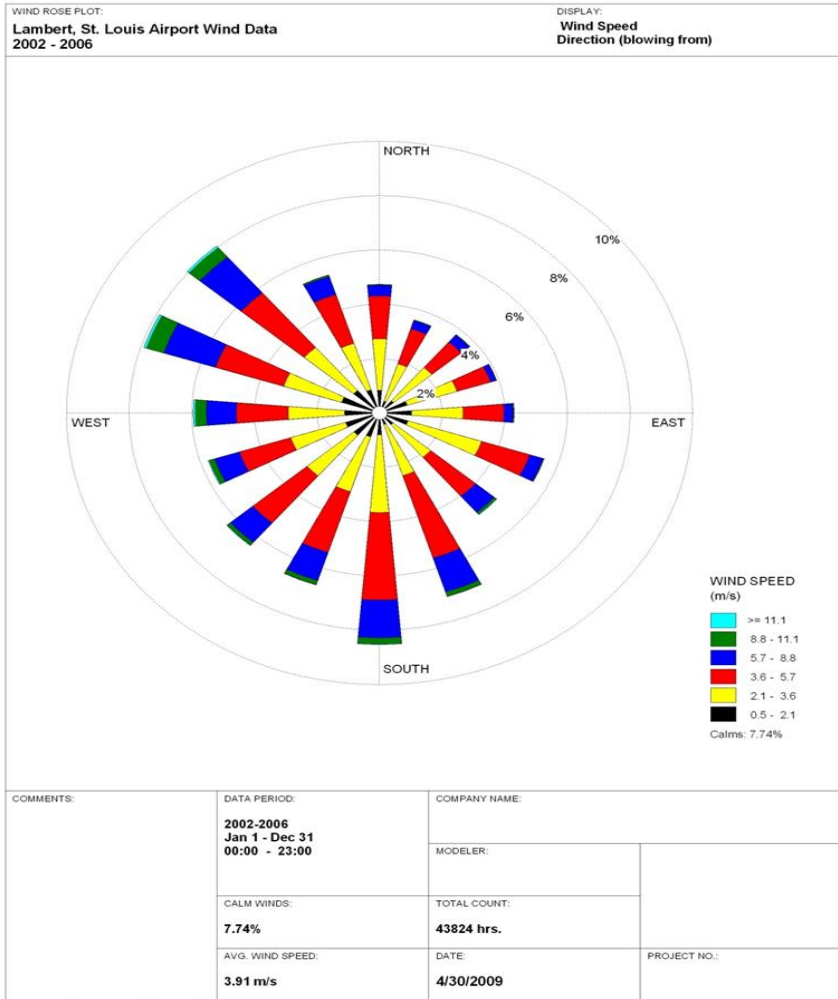
Siting Criteria

- Near-road monitoring stations must be within **50 meters (164 feet)** of target road segments to measure expected peak concentrations; within 20 meters is desirable.
- **Microscale** near-road NO₂ and CO monitors must have inlets between 2 and 7 meters above ground level.

St. Louis Forest Park monitoring site

- Brief review of site location.**
- Monitoring Results.**





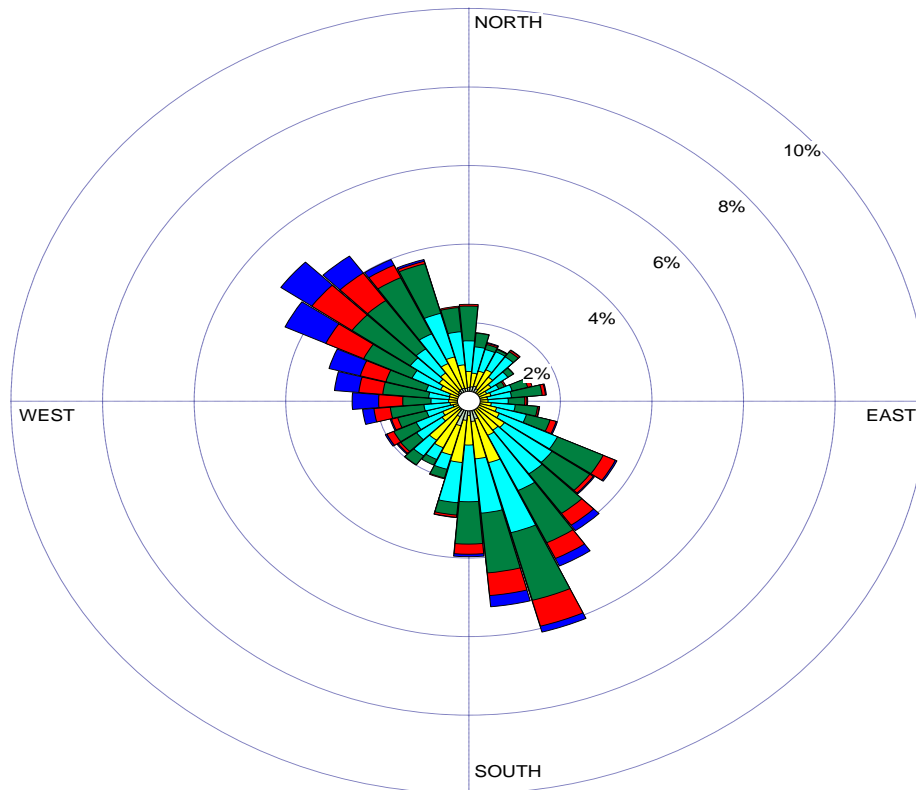
Lambert Airport Wind Rose, 2002-2006

WIND ROSE PLOT:

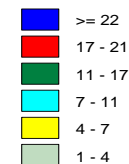
Forest Park 01-13 to 3-14

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(Knots)



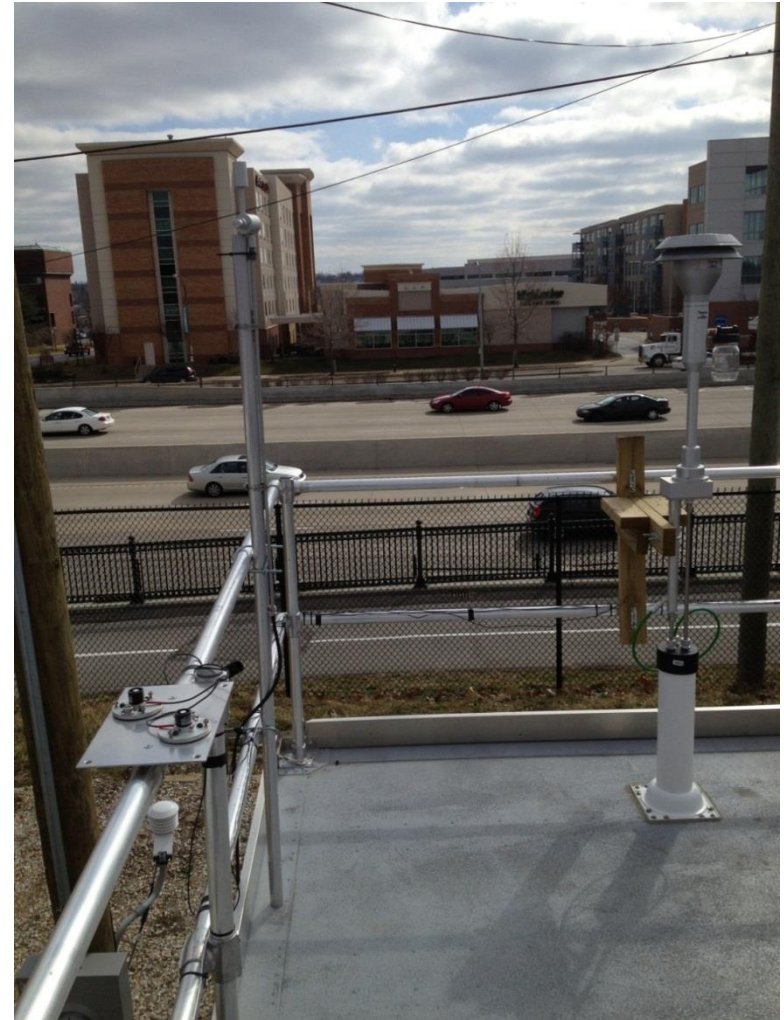
Calms: 0.72%

Forest Park Wind Rose, 1/2013-3/2014



Forest Park Near Roadway Siting Location

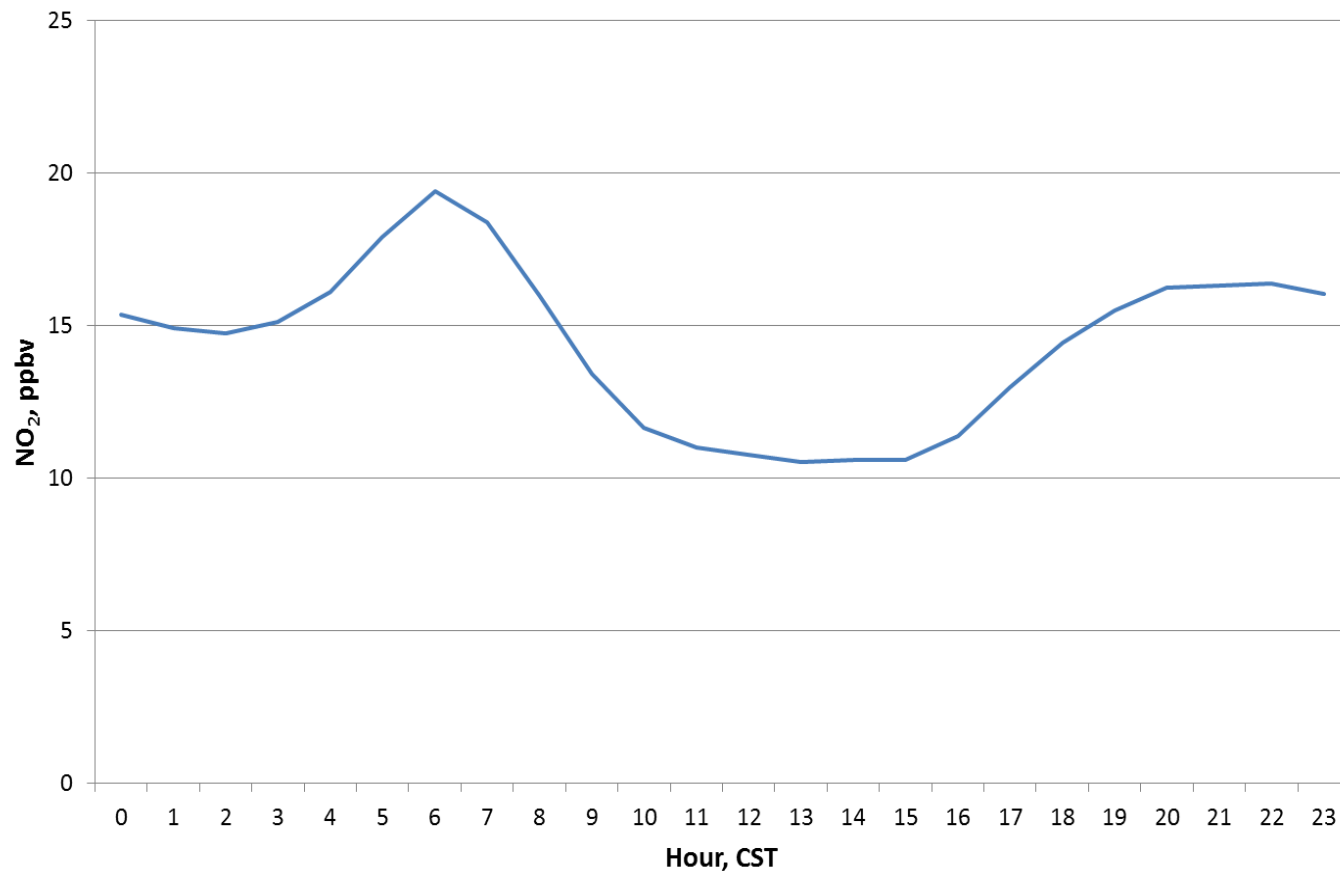




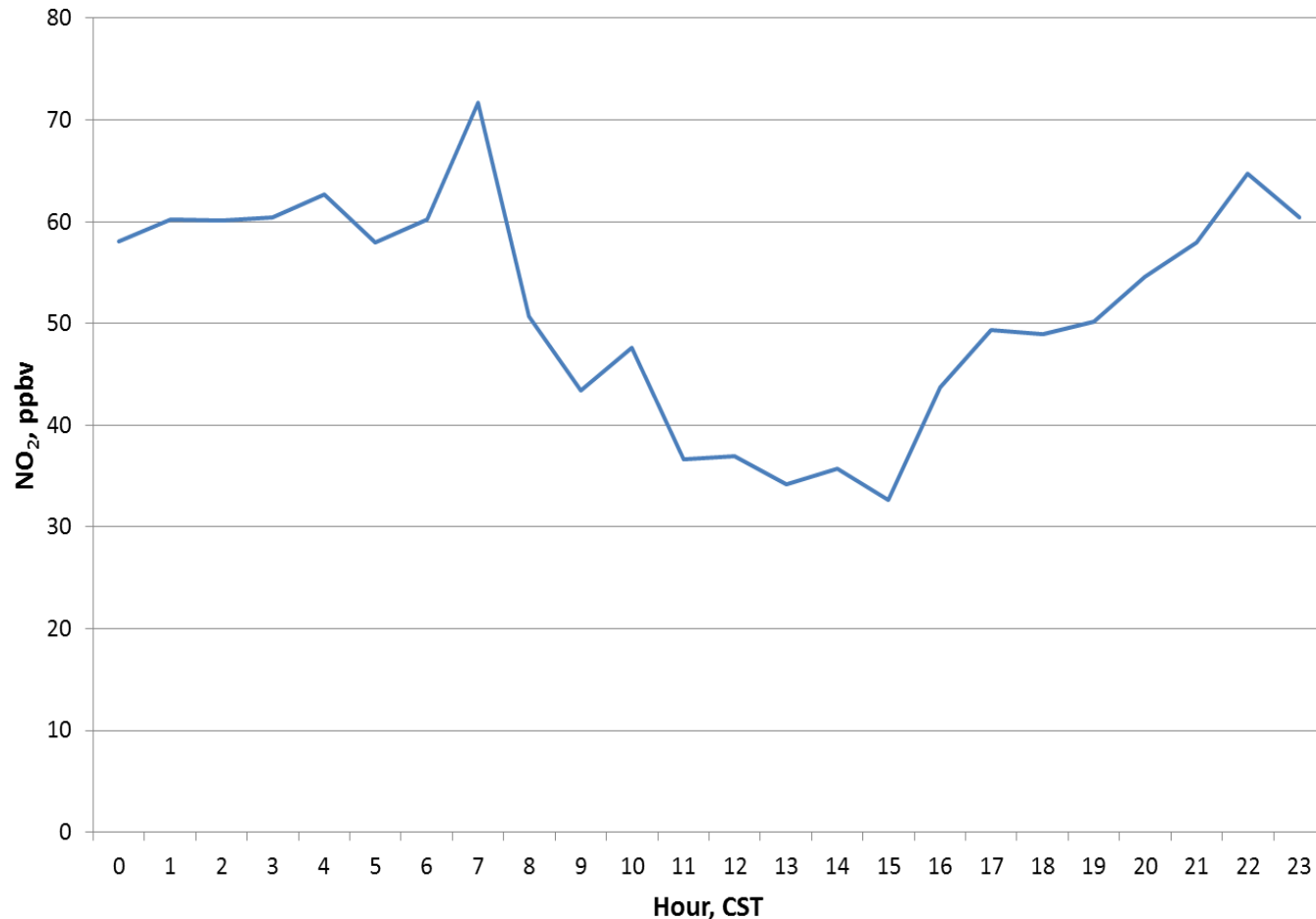
Forest Park monitoring site (~24 meters from edge of nearest traffic lane.)

Monitoring Results, Forest Park monitoring site

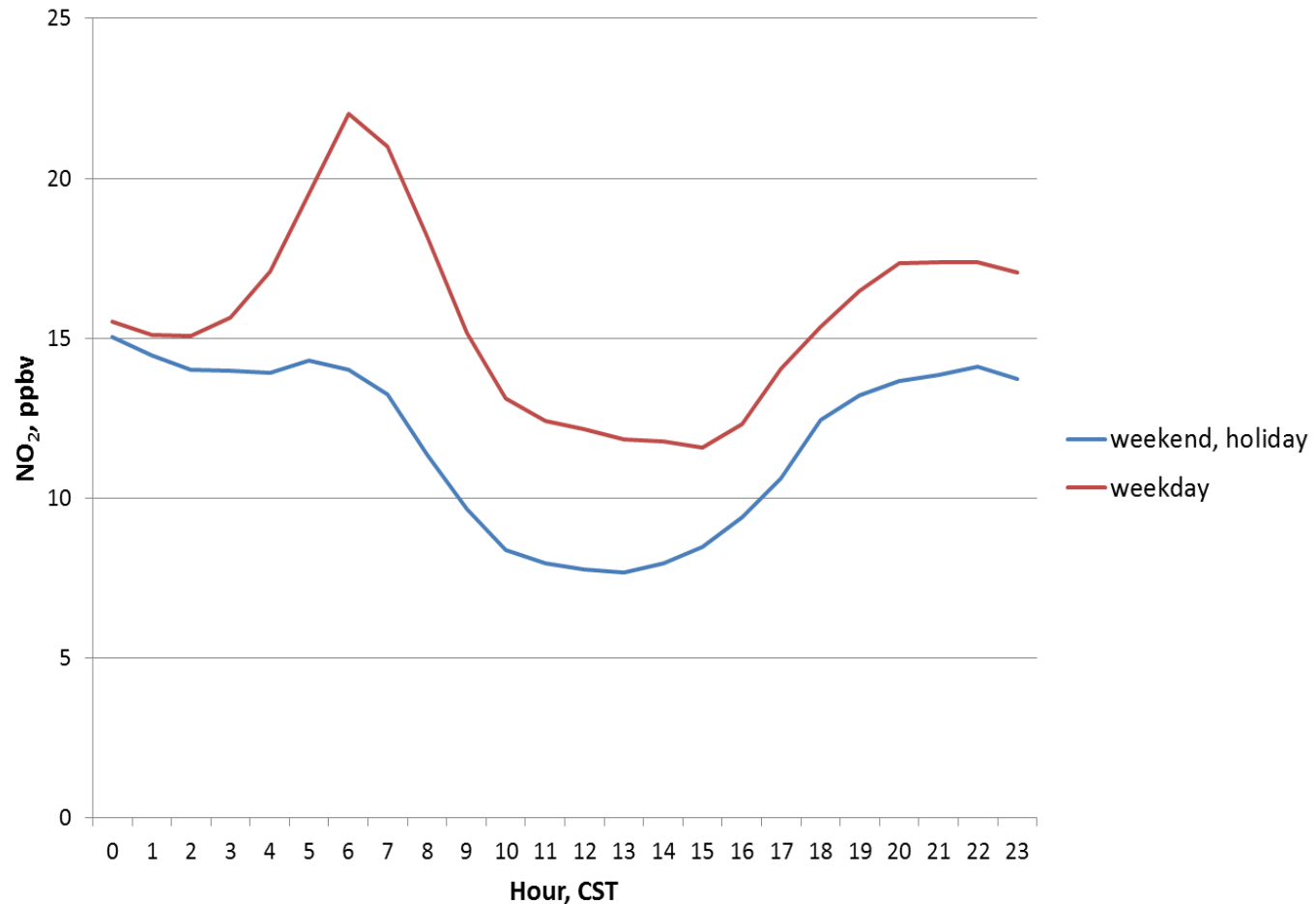
**Forest Park, Average NO_2 Concentration by Time of Day,
1/1/2013-3/31/2014**



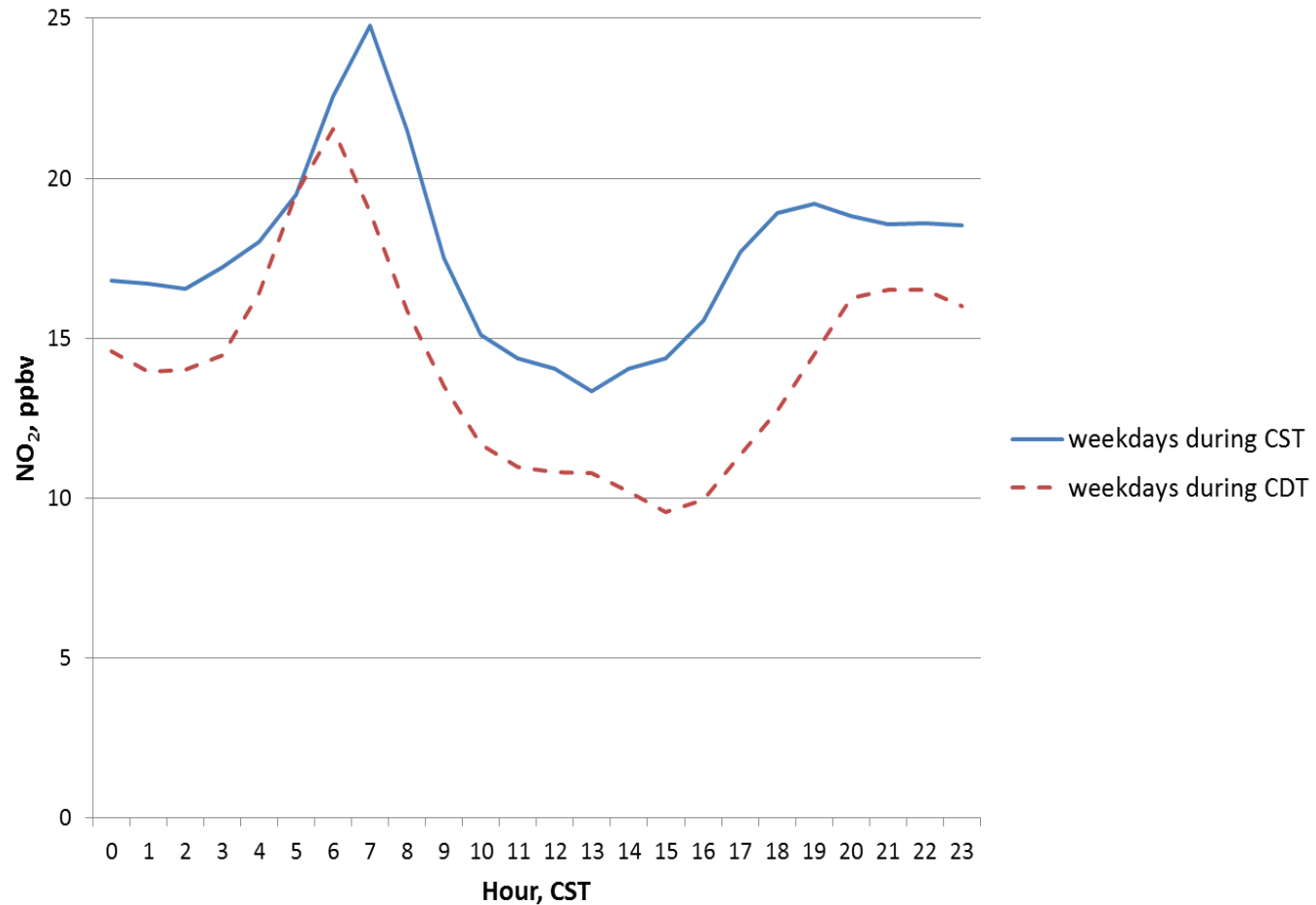
**Forest Park, Maximum NO₂ Concentration by Time of Day,
1/1/2013-3/31/2014**



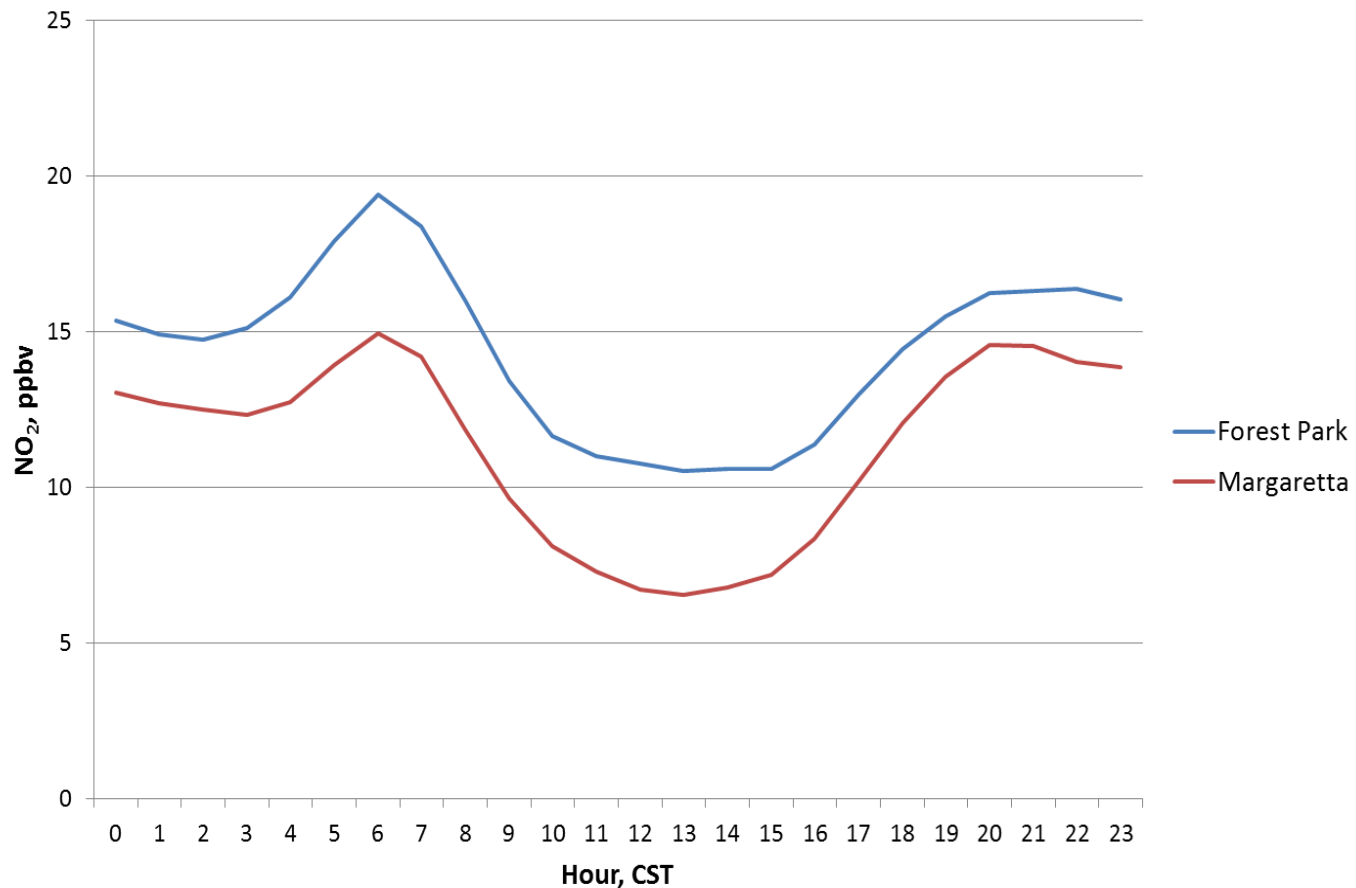
**Forest Park, Average NO₂ Concentration by Time of Day,
1/1/2013-3/31/2014**



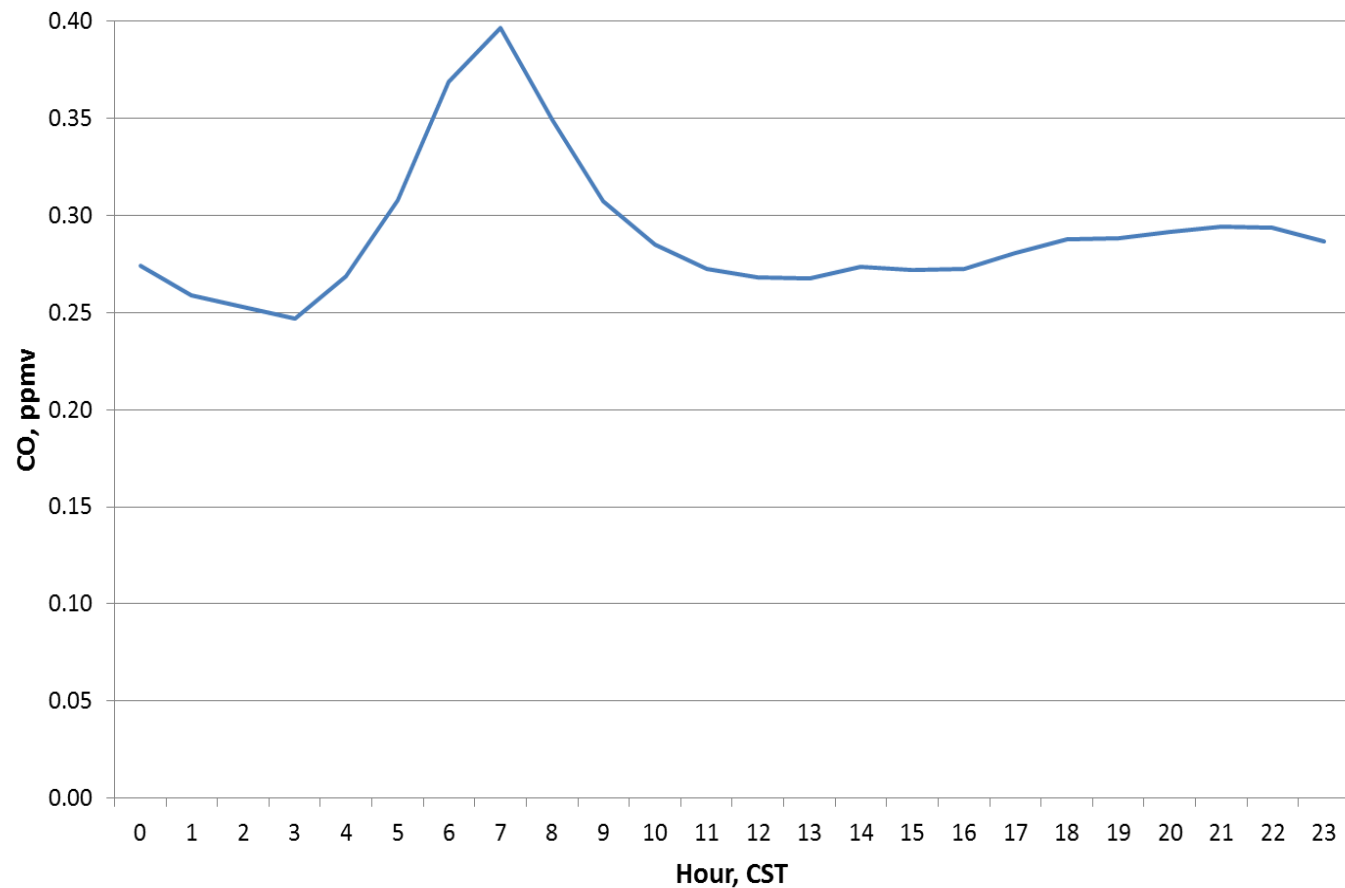
**Forest Park, Average NO₂ Concentration by Time of Day,
1/1/2013-3/31/2014**



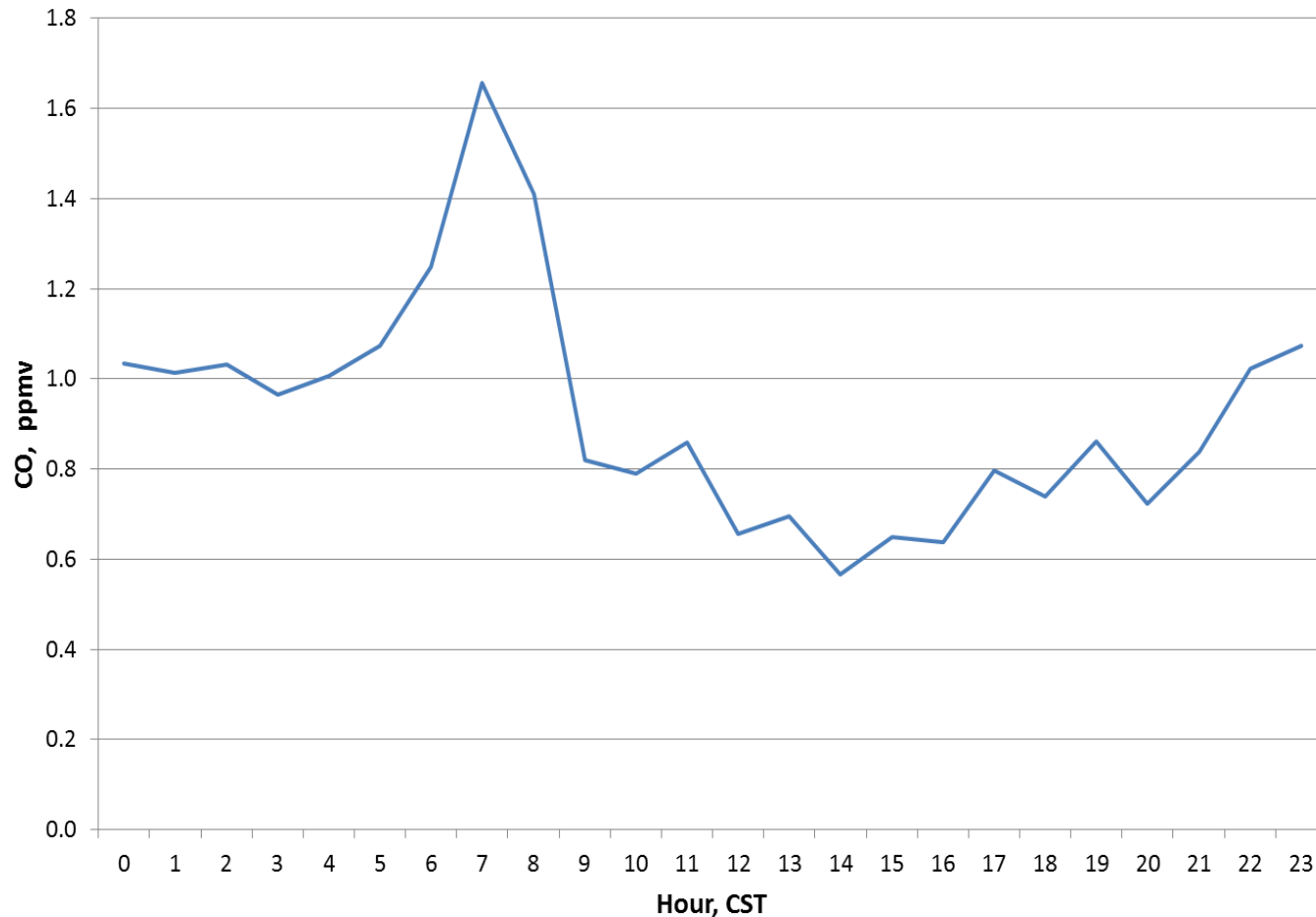
**Average NO₂ Concentration by Time of Day,
1/1/2013-3/31/2014**



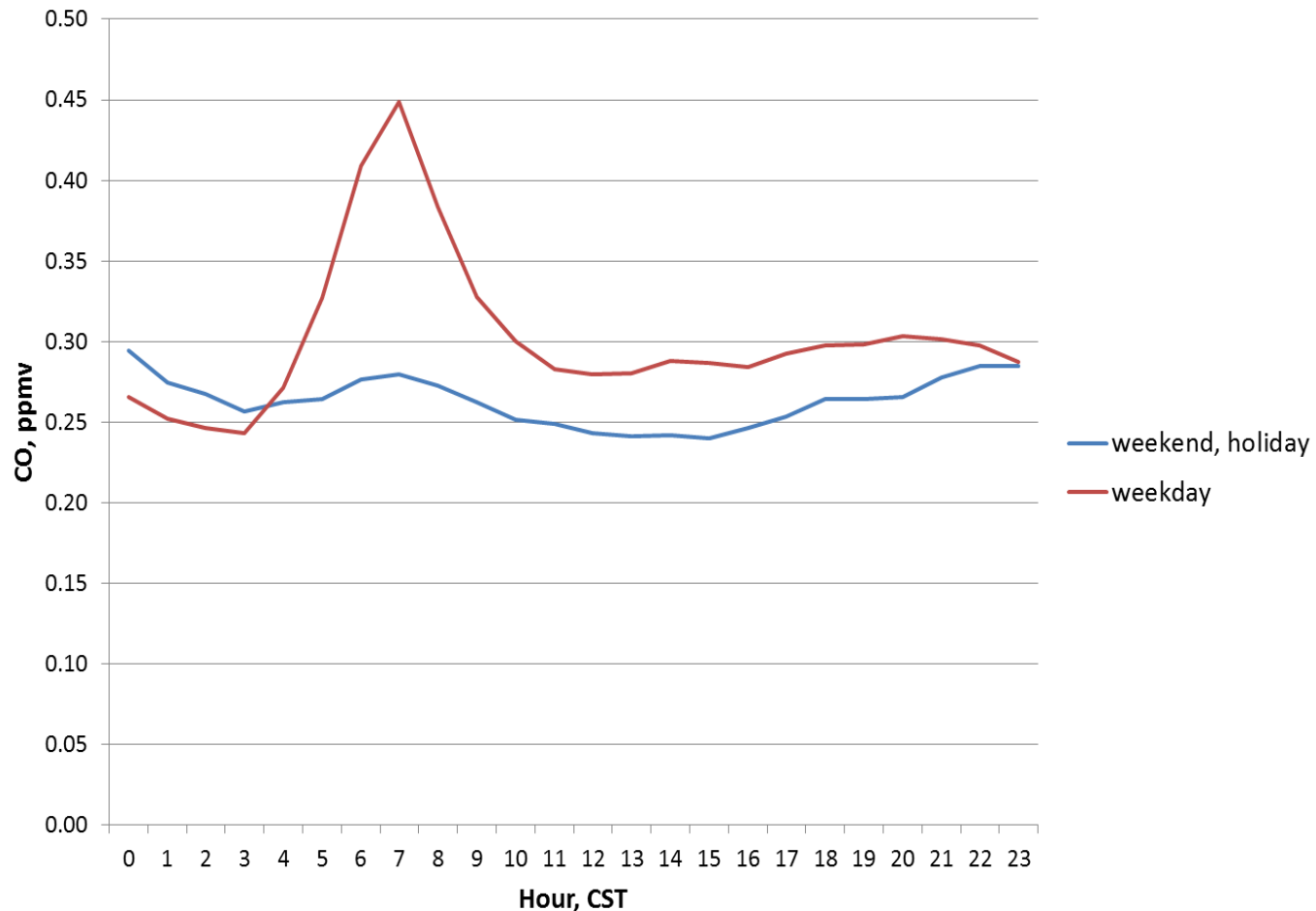
**Forest Park, Average CO Concentration by Time of Day,
1/1/2013-3/31/2014**



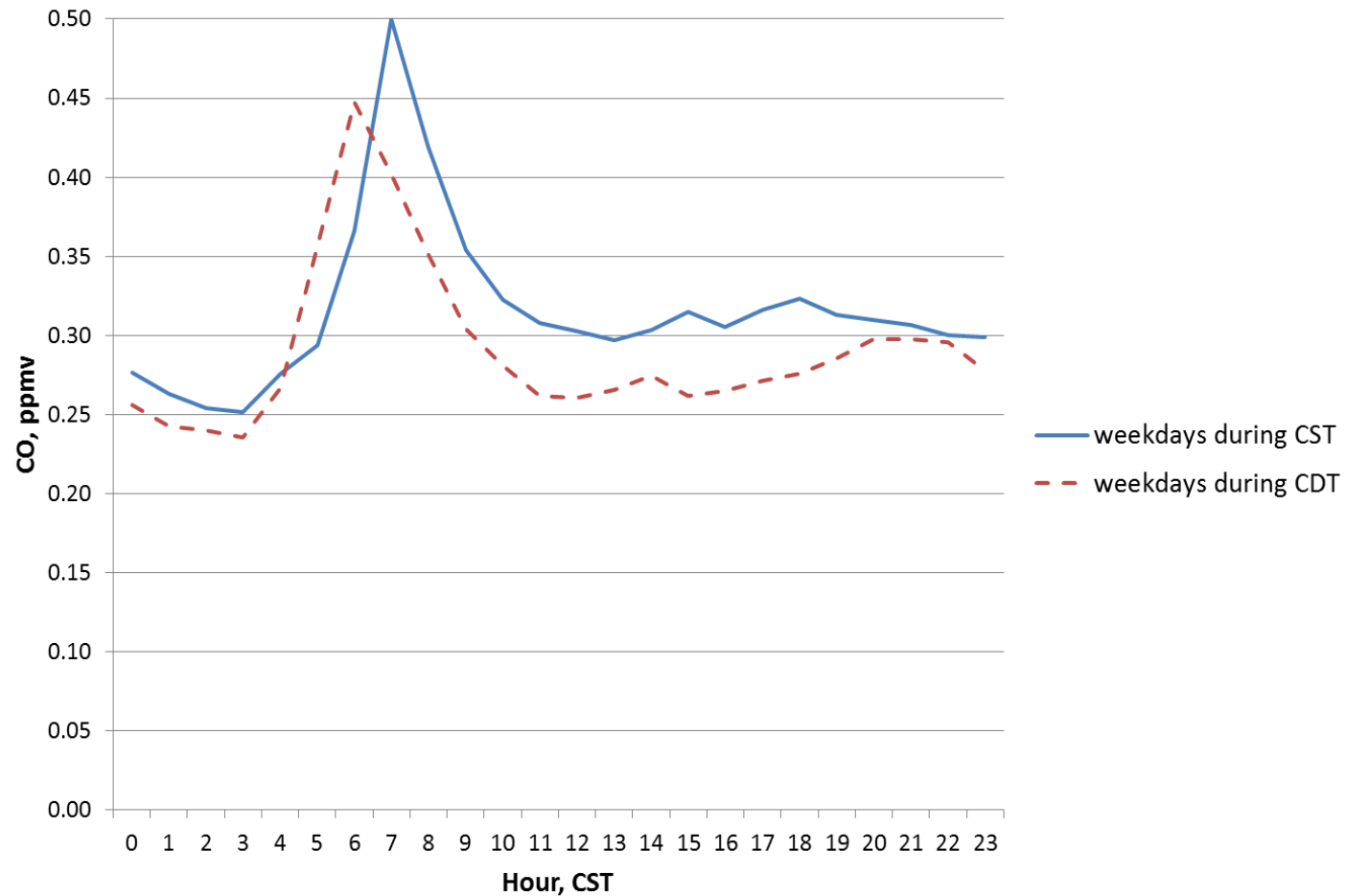
**Forest Park, Maximum CO Concentration by Time of Day,
1/1/2013-3/31/2014**



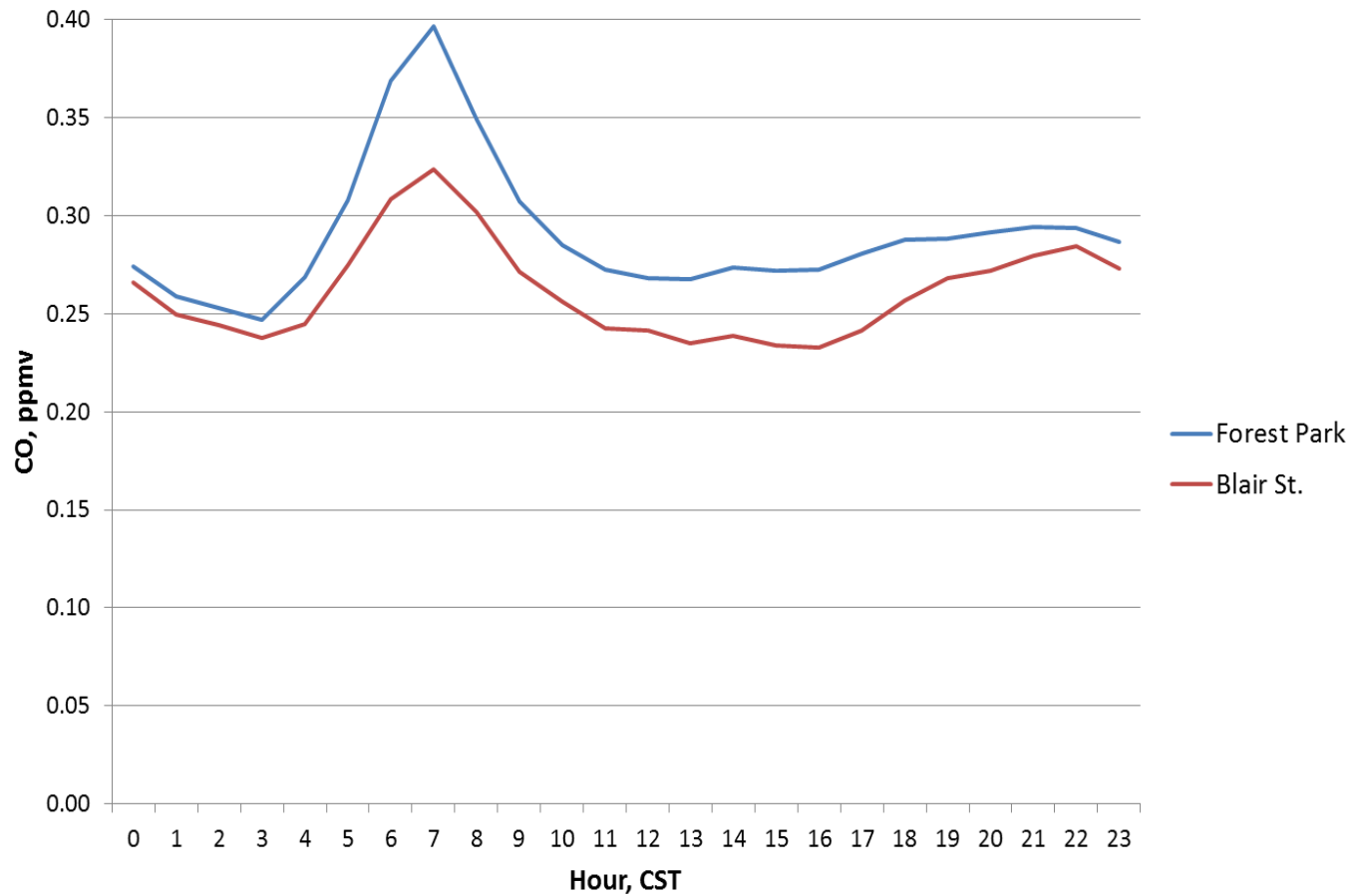
**Forest Park, Average CO Concentration by Time of Day,
1/1/2013-3/31/2014**



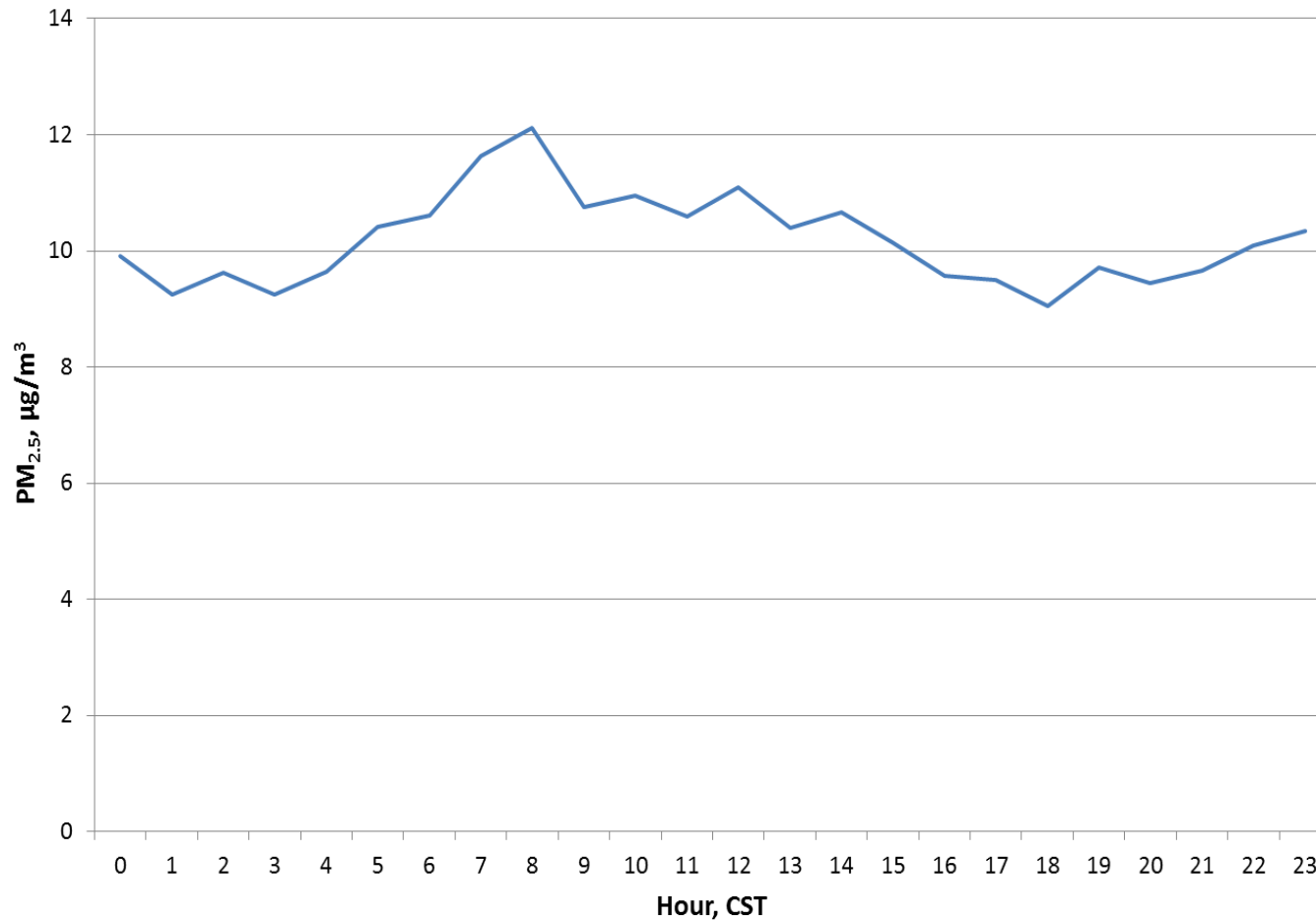
**Forest Park, Average CO Concentration by Time of Day,
1/1/2013-3/31/2014**



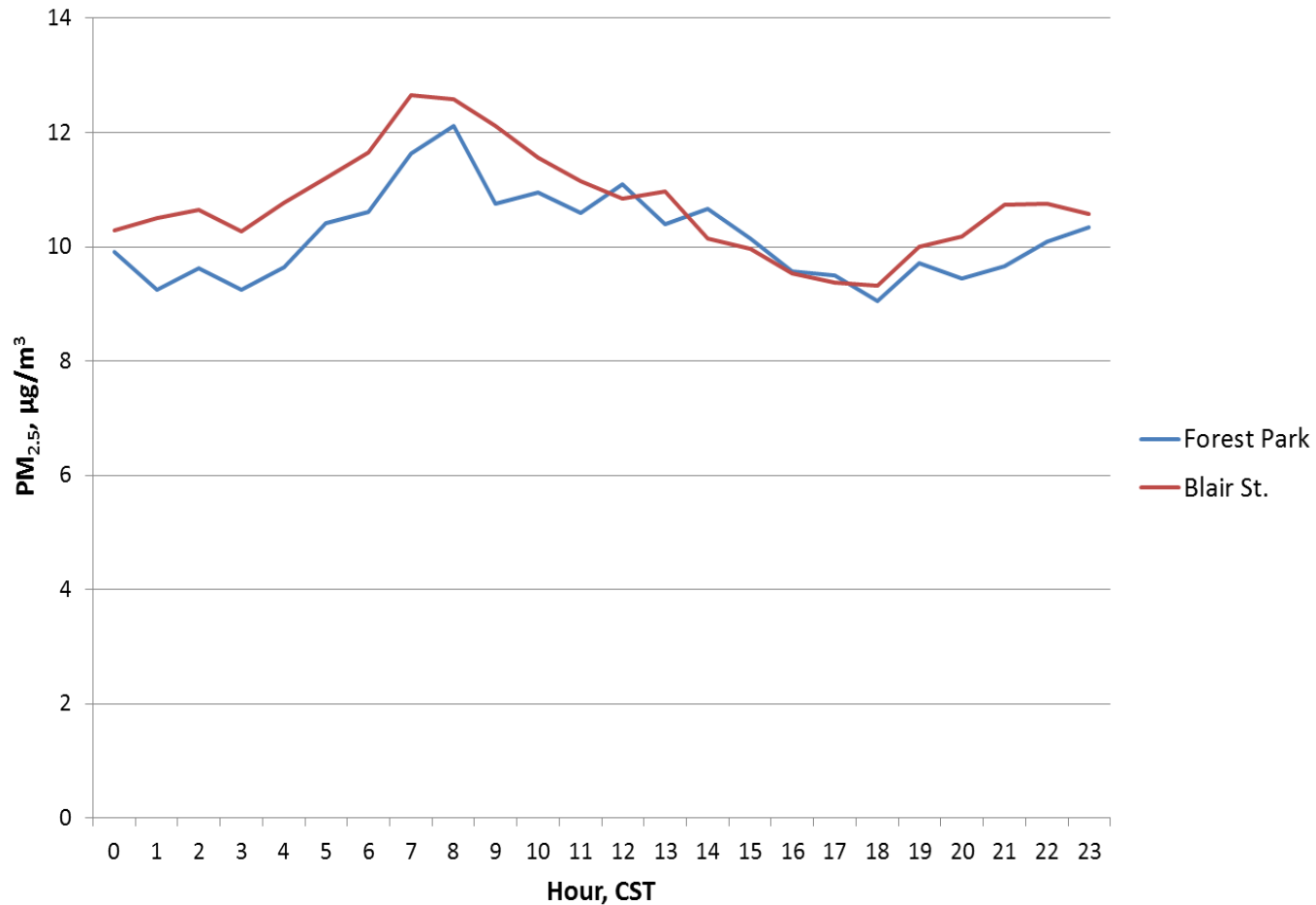
**Average CO Concentration by Time of Day,
1/1/2013-3/31/2014**



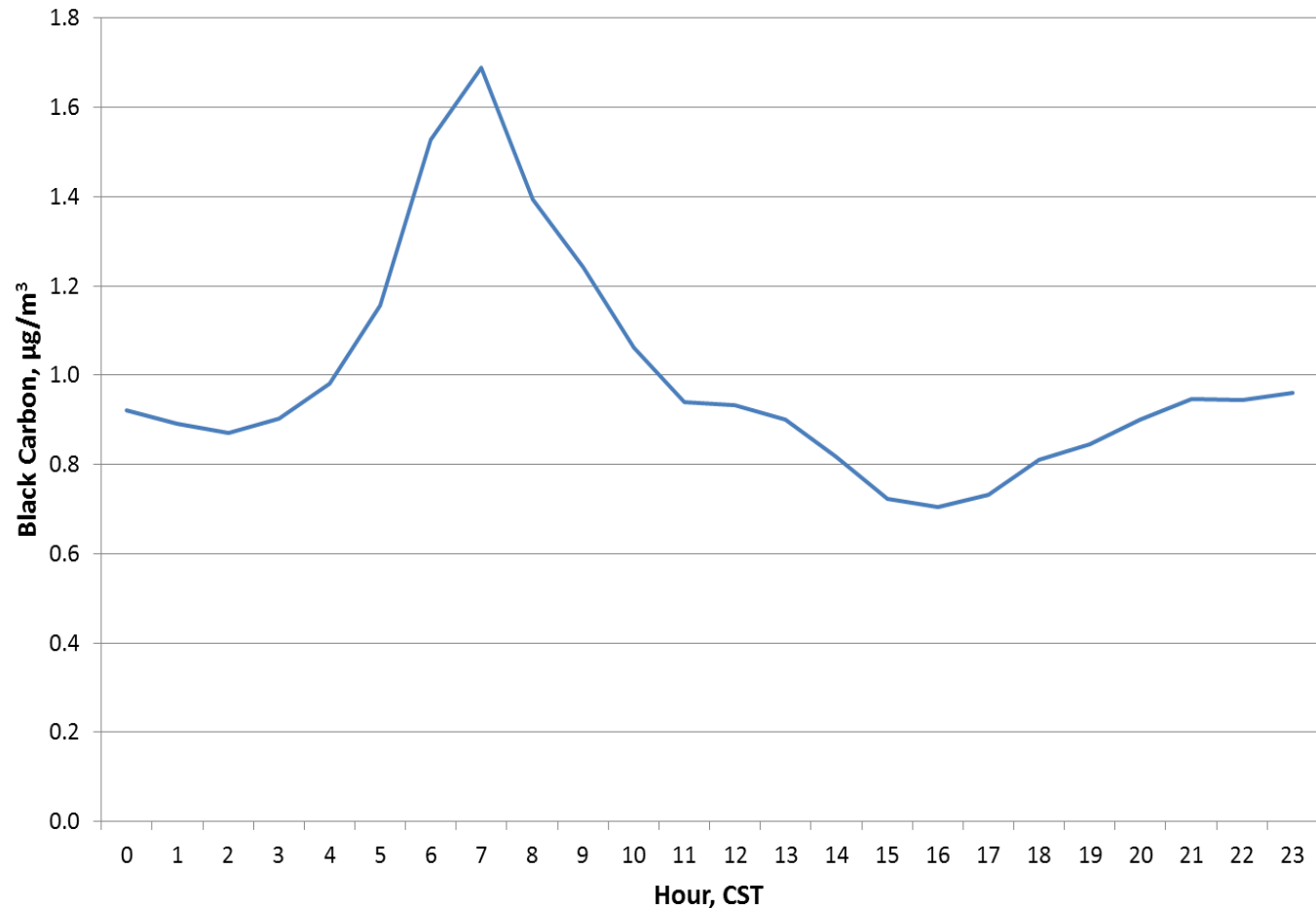
**Forest Park, Average PM_{2.5} Concentration by Time of Day,
1/1/2013-3/31/2014**



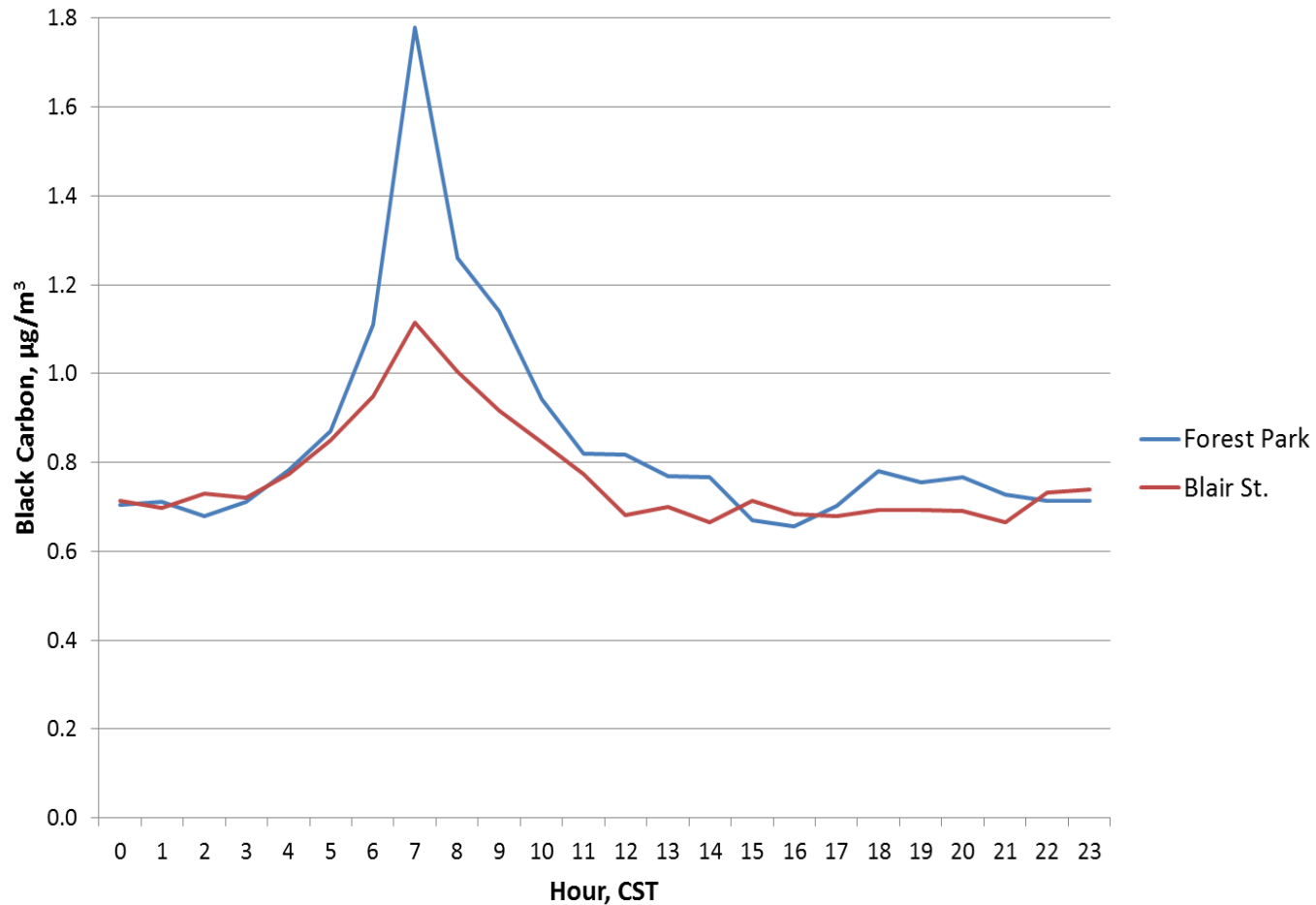
**Forest Park, Average PM_{2.5} Concentration by Time of Day,
1/1/2013-3/31/2014**



**Forest Park, Average Black Carbon Concentration by Time of Day,
1/1/2013-3/31/2014**

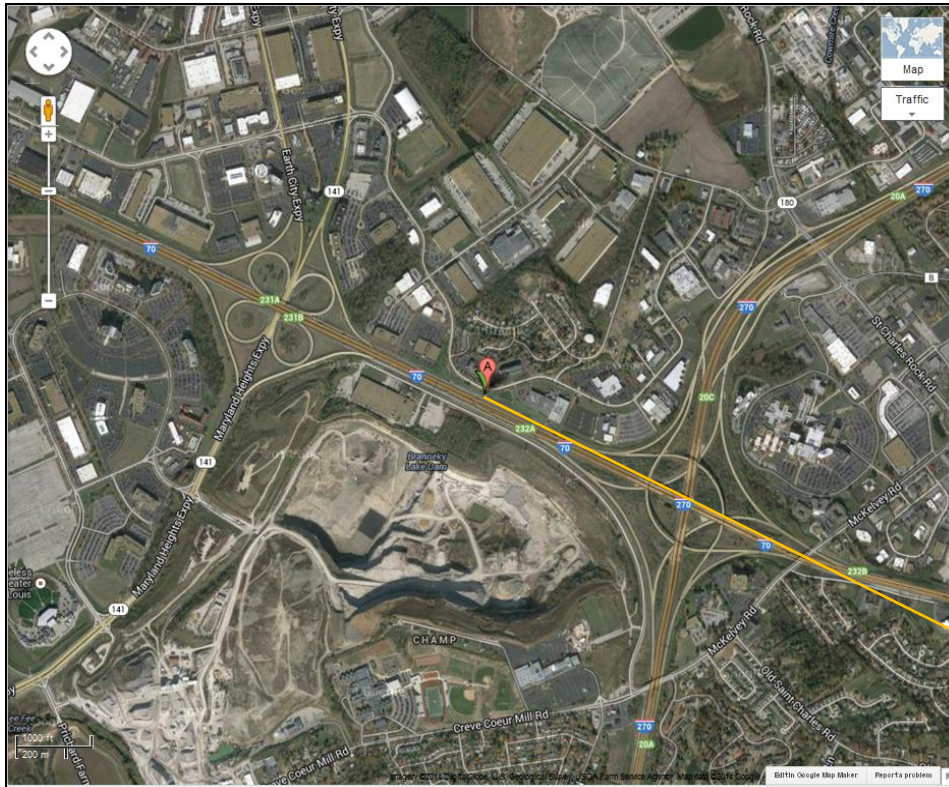


**Average Black Carbon Concentration by Time of Day,
12/1/2013-3/31/2014 (note reduced time period)**



Monitoring Results, Forest Park monitoring site

- NO₂, CO, and BC concentrations show significant morning peaks on weekdays. No significant evening peaks.
- NO₂ and CO do not show strong potential to violate standards.
- Black Carbon contributes, on average, less than 1 µg/m³ to PM_{2.5}.



The new proposed second St. Louis Area Near Roadway Siting Location 'Rider Trail, I-70'



Creating Onroad Mobile Source Emission Inventories

National Emissions Inventory (NEI)

- Every three years: next inventory for 2014 emission year
- Onroad Mobile one of several categories, including Point, Non-Point, and Nonroad
- EPA uses inventory for national air modeling
- Missouri uses inventory in SIP development

MOtor Vehicle Emission Simulator (MOVES)

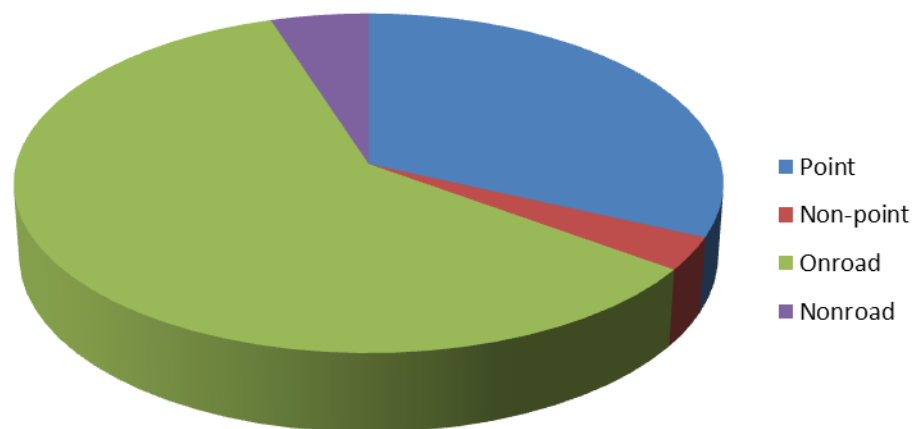
- State specific data collected from MoDOT, the Missouri DOR, East-West Gateway, and MARC
- Combination of State and National data used to run model
- Model produces emissions by county for month and year
- Average day emissions for each month are also calculated

EPA vs State Inventory

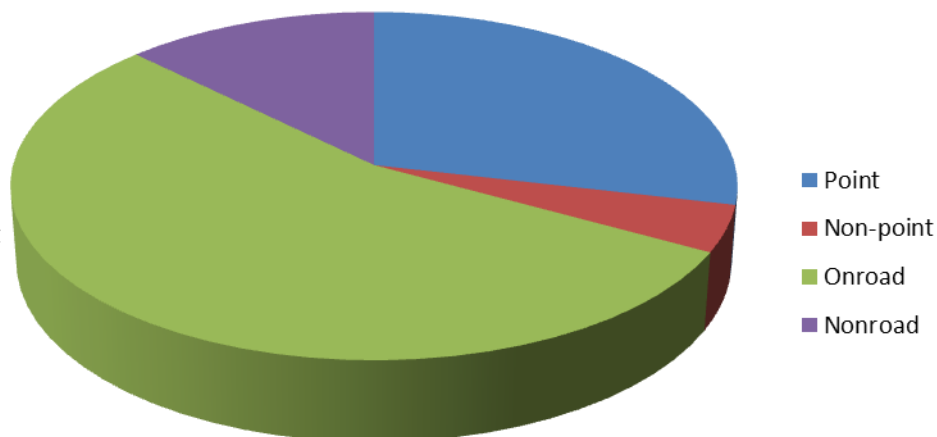
- Missouri runs MOVES in Inventory Mode
 - county specific inputs
 - average monthly meteorology
 - monthly fuel data
- EPA runs SMOKE-MOVES
 - creates emission rates for representative counties
 - applies rates to hourly meteorology data
 - uses two fuel types: winter and summer

2011 Ratio of NOx Emissions

NOx for St Louis Area Counties

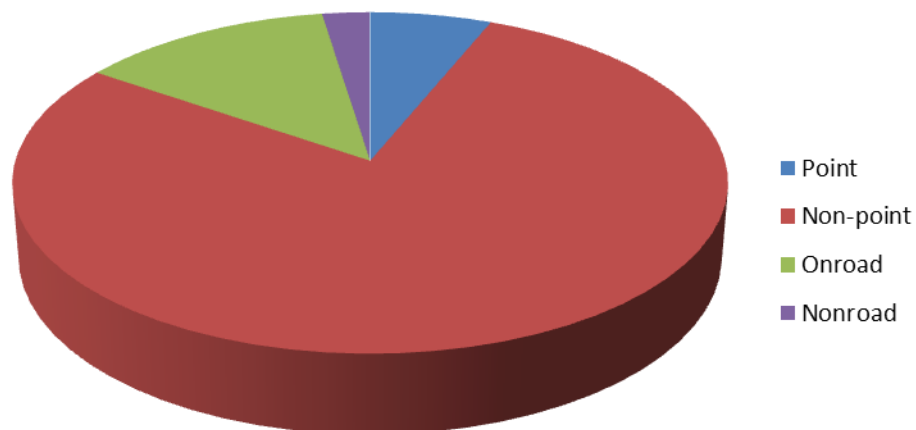


NOx Statewide

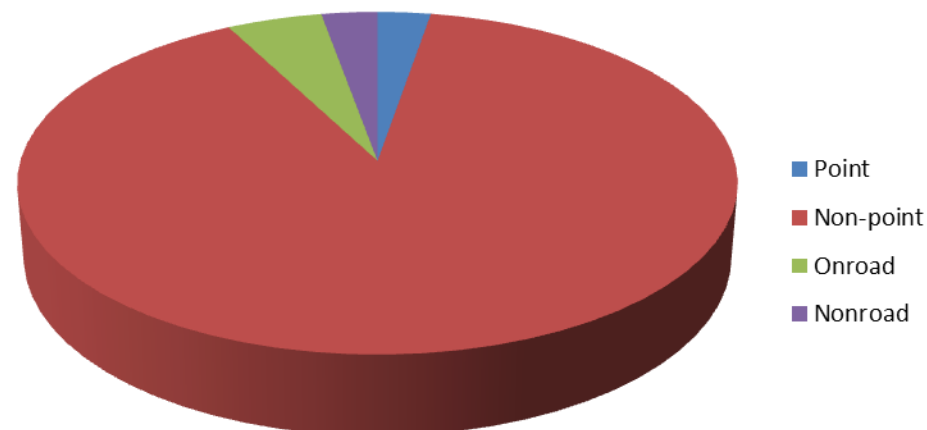


2011 Ratio of PM 2.5 Emissions

PM 2.5 for St Louis Area Counties



PM 2.5 Statewide



Emissions Inventory and Air Monitoring

- The emissions inventory can help identify sources of emissions for air monitoring
- Daily and weekly fluctuations are not captured in the inventory
- Other than Point Source emissions, the inventory is at the county level, and does not look at specific roadways

Division of Environmental Quality Director: Leanne Tippet Mosby

Date: April 2, 2014

Nothing in this document may be used to implement any enforcement action or levy any penalty unless promulgated by rule under chapter 536 or authorized by statute.